CLAIMS

What is claimed is:

1. An apparatus comprising:

a spring cage having a rectangular frame with four sides and four corners, having a first spring tab to engage a heatsink attached to a first side of the rectangular frame by a first spring portion, having a second spring tab to engage a heatsink attached to a second side of the rectangular frame by a second spring portion wherein the second side is opposite the first side, having a first retention point formed at a first corner of the rectangular frame, and having a second retention point formed at a second corner of the rectangular frame that is adjacent to the first corner;

an actuation lever having a first and second actuator portions, wherein both first and second actuator portions are of elongate shape having a first end and a second end, wherein the first ends of both the first and second actuator portions are connected together by a lever portion, wherein a first retention point is formed at the second end of the first actuator portion, wherein a second retention point is formed at the second end of the second actuator portion, and wherein pivot points are provided on both first and second actuator portions to cooperate with corresponding pivot points provided on the rectangular frame of the spring cage to form a pivoting connection between the actuation lever and the spring cage; and

a retention module having a rectangular frame having at least two circuitboard tabs to engage a circuitboard, having a first pair of retention points on the rectangular frame of the retention module to engage the first and second retention points of the rectangular frame of the spring cage, and having a second pair of retention points on the rectangular frame of the retention module to

engage the third and fourth retention points of the actuator portions of the actuation lever;

2. The apparatus of claim 1, wherein the spring cage further comprises a first heatsink hard tab attached to a third side of the rectangular frame and a second heatsink hard tab attached to a fourth side of the rectangular frame, wherein the first and second heatsink hard tabs engage a heatsink to prevent the heatsink from moving closer than a predetermined distance towards a circuitboard to which the retention module is attached to prevent damage to an IC in contact with the heatsink.

3. The apparatus of claim 1, wherein the spring cage further comprises a first heatsink hard tab attached to a third side of the rectangular frame and a second heatsink hard tab attached to a fourth side of the rectangular frame, wherein the first and second heatsink hard tabs engage a heatsink to prevent the heatsink from moving beyond a predetermined distance away from a circuitboard to which the retention module is attached to prevent the heatsink from being pulled out of engagement with the first and second spring tabs.

4. The apparatus of claim 1, wherein each one of the first pair of retention points on the rectangular frame of the retention module is comprised of a retention opening formed through the rectangular frame of the retention module, each with a pin protruding therethrough, and the first and second retention points formed in the first and second corners of the rectangular frame of the spring cage are each a retention opening formed in the first and second corners to each receive the pin protruding through a corresponding one of the retention

openings comprising a corresponding one of the first pair of retention points on the rectangular frame of the retention module.

5. The apparatus of claim 1, wherein each one of the second pair of retention points on the rectangular frame of the retention module is comprised of a retention opening formed through the rectangular frame of the retention module, each with a pin protruding therethrough, and the first and second retention points formed on the second end of each of the first and second actuator portions is a retention notch to each receive the pin protruding through a corresponding one of the retention openings comprising a corresponding one of the second pair of retention points on the rectangular frame of the retention module.

6. The apparatus of claim 1, wherein each one of the first pair of retention points on the rectangular frame of the retention module is comprised of a retention opening formed through the rectangular frame of the retention module, and the first and second retention points formed at the first and second corners of the rectangular frame of the spring cage are each a retention tab to protrude into a corresponding one of the retention openings comprising a corresponding one of the first pair of retention points on the rectangular frame of the retention module.

7. The apparatus of claim 1, wherein each one of the second pair of retention points on the rectangular frame of the retention module is comprised of a retention opening formed through the rectangular frame of the retention module, and the first and second retention points formed on the second end of each of the first and second actuator portions are each a retention tab to protrude into a corresponding one of the retention openings comprising a corresponding one of

the second pair of retention points on the rectangular frame of the retention module.

8. The apparatus of claim 1, wherein the pivot points on the first and second actuator portions of the actuation lever are each pivot openings formed through the first and second actuator portions, wherein the corresponding pivot points on the rectangular frame of the spring cage are each pivot openings formed through the rectangular frame of the spring cage, and the pivoting connection between the actuation lever and the rectangular frame of the spring cage is formed with the insertion of pieces of pivot hardware through the pivot openings of the first and second actuator portions and corresponding pivot openings of the rectangular frame of the spring cage.

9. The apparatus of claim 8, wherein the pieces of pivot hardware are each rivets.

10. The apparatus of claim 1, wherein the pivoting connection between the actuation lever and the rectangular frame of the spring cage is comprised of a pair of double-flush engagements, each created with a pierced extrusion through the rectangular frame of the spring cage staked into a countersink formed in a corresponding one of the two actuator portions of the actuation lever.

11. The apparatus of claim 1, further comprising a circuitboard to which the retention module is attached.

12. The apparatus of claim 11, further comprising an IC attached to the circuitboard on the same surface as that to which the retention module is attached and positioned on that surface at a location within the location of the retention module such that the rectangular frame of the retention module surrounds the IC.

13. An apparatus comprising:

a spring cage having a rectangular frame with four sides and four corners, having a first spring tab to engage a heatsink attached to a first side of the rectangular frame by a first spring portion, having a second spring tab to engage a heatsink attached to a second side of the rectangular frame by a second spring portion wherein the second side is opposite the first side, having a first heatsink hard tab to engage a heatsink attached to a third side of the rectangular frame, having a second heatsink hard tab to engage a heatsink attached to a fourth side of the rectangular frame wherein the fourth side is opposite the third side, having a first retention point to engage a retention module attached to a circuitboard formed at a first corner of the rectangular frame, and having a second retention point to engage a retention module attached to a circuitboard formed at a second corner of the rectangular frame that is adjacent to the first corner; and

an actuation lever having a first and second actuator portions, wherein both first and second actuator portions are of elongate shape having a first end and a second end, wherein the first ends of both the first and second actuator portions are connected together by a lever portion, wherein a first retention point to engage a retention module attached to a circuitboard is formed at the second end of the first actuator portion, wherein a second retention point to engage a retention module attached to a circuitboard is formed at the second end of the

second actuator portion, wherein pivot points are provided on both first and second actuator portions to cooperate with corresponding pivot points provided on the rectangular frame of the spring cage to form a pivoting connection between the actuation lever and the spring cage, and wherein at least one latch tab is attached to the lever portion and is positioned to engage at least one corresponding latch tab attached to the rectangular frame of the spring cage to latch together the actuation lever and the spring cage when the lever portion of the actuation lever is pivoted towards the spring cage.

14. The apparatus of claim 13, wherein the first and second retention points formed in the first and second corners of the rectangular frame of the spring cage are each a retention opening formed in the first and second corners to each receive a corresponding pin protruding from a rectangular frame of a retention module.

15. The apparatus of claim 13, wherein the first and second retention points formed on the second end of each of the first and second actuator portions is a retention notch to each receive a corresponding pin protruding from a rectangular frame of a retention module.

16. The apparatus of claim 13, wherein the first and second retention points formed at the first and second corners of the rectangular frame of the spring cage are each a retention tab to protrude into a corresponding retention opening formed through the rectangular frame of a retention module.

17. The apparatus of claim 13, wherein the first and second retention points formed on the second end of each of the first and second actuator portions are

each a retention tab to protrude into a corresponding retention opening formed through the rectangular frame of a retention module.

18. The apparatus of claim 13, wherein the pivot points on the first and second actuator portions of the actuation lever are each pivot openings formed through the first and second actuator portions, wherein the corresponding pivot points on the rectangular frame of the spring cage are each pivot openings formed through the rectangular frame of the spring cage, and the pivoting connection between the actuation lever and the rectangular frame of the spring cage is formed with the insertion of pieces of pivot hardware through the pivot openings of the first and second actuator portions and corresponding pivot openings of the rectangular frame of the spring cage.

19. The apparatus of claim 18, wherein the pieces of pivot hardware are each rivets.

20. The apparatus of claim 13, wherein the pivoting connection between the actuation lever and the rectangular frame of the spring cage is comprised of a pair of double-flush engagements, each created with a pierced extrusion through the rectangular frame of the spring cage staked into a countersink formed in a corresponding one of the two actuator portions of the actuation lever.

21. The apparatus of claim 13, further comprising a retention module having a rectangular frame having at least two circuitboard tabs to engage a circuitboard, having a first pair of retention points on the rectangular frame of the retention module to engage the first and second retention points of the rectangular frame of the spring cage, and having a second pair of retention

points on the rectangular frame of the retention module to engage the third and fourth retention points of the actuator portions of the actuation lever.

22. The apparatus of claim 21, further comprising a circuitboard to which the retention module is attached.

23. The apparatus of claim 22, further comprising an IC attached to the circuitboard on the same surface as that to which the retention module is attached and positioned on that surface at a location within the location of the retention module such that the rectangular frame of the retention module surrounds the IC.

24. A method comprising:

pivotally connecting pivot points of a pair of actuator portions of an actuation lever with corresponding pivot points of a rectangular frame of a spring cage; and

inserting a heatsink within the rectangular frame of the spring cage to cause at least two spring tabs attached to the rectangular frame of the spring cage by corresponding spring portions to engage the heatsink, and to cause at least two hard tabs attached to the rectangular frame of the spring cage to also engage the heatsink.

25. The method of claim 24, further comprising:

attaching the rectangular frame of a retention module to a circuitboard; and

inserting the combination of the actuation lever, spring cage and heatsink into the rectangular frame of the retention module to cause at least one retention point on the rectangular frame of the spring cage to engage at least one corresponding retention point on the rectangular frame of the retention module.

26. The method of claim 25, further comprising:

pivoting the actuation lever relative to the spring cage to cause at least one retention point on an end of at least one of the pair of actuator portions of the actuation lever to engage at least one corresponding retention point on the rectangular frame of the retention module, and to cause a thermal conductive surface of the heatsink to come into contact with a surface of a package of an IC attached to the circuitboard.

27. The method of claim 26, further comprising pivoting the actuation lever to a position where the actuation lever is able to be latched to the spring cage.